An Experiment in Archeological Site Stabilization—Part II

Cumberland Island National Seashore

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Changes in the natural and cultural environment on and around Cumberland Island National Seashore are accelerating shoreline erosion; the rate of loss of unprotected cultural deposits has increased accordingly. Surprisingly, along the northwest shore between Terrapin Point and Cumberland Wharf, the tidal marsh zones are stabilizing thanks to an increase of naturally deposited oyster shell rakes (dikes). Construction of an experimental, artificial rake emulating this natural phenomenon was undertaken in June 1990. Part I of this report appeared in an earlier issue of *CRM* (Vol. 14, No. 2). This commentary discusses the outcome of the experiment.

Numerous significant archeological sites and cultural resources are being severely degraded through cutbank shoreline erosion on the western side of Cumberland Island National Seashore, GA. Wind- and boat-generated waves, daily tidal fluctuations, and the deepening of the inland waterway are taking their toll. While some portions of the shoreline are eroding, others are rebuilding and developing stable tidal marsh zones. This rebuilding process is attributed to the formation and expansion of an interlacing network of naturally deposited oyster shell rakes.

The rakes may rise to a uniform height of 2' above mean high tide. They vary in basal width according to wave force factors that cause the shell deposition. This tightly compacted shell is resistant to low tide wave action and further stabilized by submersion during high tide. The rakes become miniature stilling ponds that act as settling basins for silts and sands carried by the Cumberland River. Tidal incursion fills the ponds, allowing sediment to accumulate as the tide goes out. The shell, tightly compacted and cemented with silt (figure 1), provides an erosion resistant armor on the active wave side while allowing water trapped behind it to filter through.

Fig. 1. Plan view of interlocked oyster shell on naturally occurring rake.

As discussed in Ehrenhard and Thorne (1991), oyster shell was shoveled into burlap bags, closed with wire ties, and laid out in a semicircle that spanned 178'. The bags were laid in two parallel, adjacent courses with a third course resting on top. The rake thus measured about 2 1/2' high and 4' wide. Cumberland Island has a sizable population of wild pigs and horses that forage and graze along newly established marsh grass communities. To protect the rake, strips of GEOWEB were installed on animal paths leading down from the bank. This material, which opens into squares, acts similar to a cattle guard, and neither pigs nor horses will cross it.

Results

Inspection of the rake in August 1990 revealed that campers and fishermen thought the burlap bags made ideal "stepping stones" to get out into deeper water. While a number of the bags from the top row of the rake had been removed for this use, the majority of the bags had rotted away leaving the shell to disperse in a natural manner (figure 2). It was encouraging to see that a rake formation process was in progress and the shell had accumulated into a compact, resistant armor (figure 3). However, it was decided to add another top course of bags both to replace those carried off by fishermen and to give the rake some additional height. This work was accomplished in October 1990.

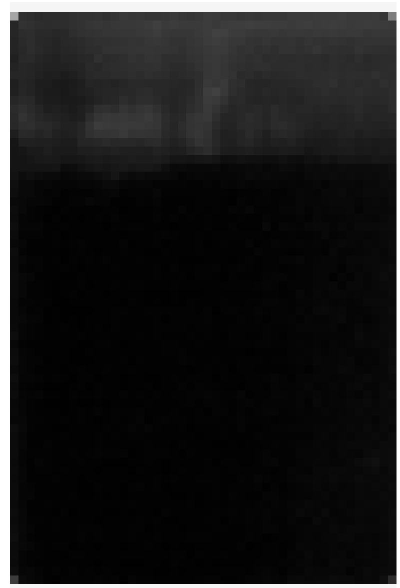

Fig. 2. Artificial rake, August 1990.

The project area was visited periodically throughout 1991 and 1992. We are pleased to report that the artificial rake has indeed performed like its natural counterparts. In fact it has worked so well that in June 1992 it was difficult to determine the exact location because the silt accumulations had completely buried the rake (figures 4 and 5). Bank erosion behind the rake was noticeably curtailed and

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Fig. 3. Plan view of interlocked oyster shell on artificial rake.

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over 2 1/2' of silt deposits were measured. The buffering action of the rake was providing a healing mechanism along the cut bank. The land surface has built up enough that tidal submersion has been minimized. Vegetative detritus accumulating along the cut bank provides an additional buffering action (figure 6). This protects the micro-environment and helps several species of marsh grass become established.

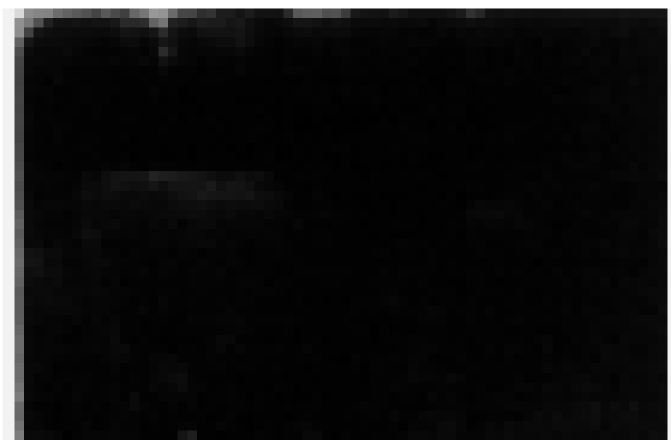

Fig. 4. Artificial rake, August 1990. Note accumulation of sediment on interior side of rake (left side of photo).

Fig. 5. Artificial rake, June 1992. Rake is the low curving rise on the right hand side of figure. Note accretion of sand and grasses beginning to grow.

Fig. 6. Detritus and sand accretion along cut bank.

The hoped for natural invasion of marsh vegetation (Ehrenhard and Thorne 1991) is beginning to occur. However, continued use of the area by campers and grazing horses have impacted the rate of revegetation. We are pleased to see that the GEOWEB has completely eliminated incursion by horses and pigs in the areas where it was placed. The GEOWEB is firmly interwoven with native grasses and, in some cases, is harboring small pine trees; these have rooted naturally in less than two years (figure 7).

Fig. 7. GEOWEB place in animal trail along cutbank. Note pine seedlings.

Summary

Although the archeological site stabilization at Cumberland Island has always been termed an experimental procedure, neither of us believed this was the case. From observation of hundreds of interwoven, naturally deposited rakes, we could chronicle the progression of shoreline stabilization from the filling process to the ultimate establishment of a completely revegetated, stabilized shoreline. As a consequence, we knew that naturally occurring micro-stabilization would and could effectively protect an area subject to shoreline loss through both natural and man-made disturbances. In our minds, the process to be demonstrated was whether or not oys-

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that are kept rarely include the shop drawings or models that translate the architect's sketches and blueprints into craft units. Lacking written documentation or working knowledge, the preservationist must carefully examine the clues given by original artifacts and weigh these against other documentary information such as photographs, engravings, bills, insurance descriptions, letters, sketches, public documents, and other scholarly interpretations of this kind of material, in order to gain an accurate understanding of the composition and evolution of the structure.

Developing a Usable List

The National Park Service has begun to compile a list of the architectural study collections in the United States by contacting potential collection holders and requesting that they share information about their collections by filling out a 2-page Request for Information. The Request for Information has been reproduced in this issue of *CRM* so that readers can identify and share information about possible collections so that the survey can be as useful and complete as possible. At present 126 collections in the National Park Service and 87 collections held by other agencies, historical societies, museums and individuals are included in the survey. If you can provide information about a collection your organization has, please fill out the Request for Information. If you can suggest sources, please contact me by mail at Preservation Assistance Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127, fax 202-343-3803 or telephone 202-343-9561. Your participation is appreciated.

In order to narrow the focus of this compilation, the following have not been included in the listing: **collections outside the United States; whole historic buildings or structures; period rooms; commercial salvage companies; furniture or furnishings; and/or tools.**

While this list will focus on architectural objects or artifacts—the three-dimensional parts of a building, there are often instances in which other information about the building will be maintained along with the objects. Such items as architectural drawings, photographs, stereopairs, postcards, and trade catalogs provide a different kind of information about a structure. Information about these collections will also be welcome and may appear in a separate listing or as a subset of this list.

Watch for additional information on this topic.

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[1] Restated from "Introduction to the Guidelines," p. xi, *The Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines for Rehabilitating Historic Buildings*, 1992.

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ter shells confined in burlap bags and manually placed would ultimately be worked into an interlocking rake. This indeed proved to be the case. The burlap bags deteriorated at an almost uniform rate, and the shell was freed to be sorted and arranged by wave activity in a uniform fashion. The end product was an artificial rake that interacted with natural forces to create a new rake as effective as those produced entirely by nature.

The Cumberland Island project required little expenditure for supplies, the most expensive being the burlap bags and the wire ties to close them. The principal cost was labor, and this was minimized by using available personnel from the National Park Service and the University of Mississippi. Through careful planning, subsistence and transportation expenses were also minimized.

We are encouraged that conservation of archeological properties can be effectuated in a fashion that emulates the natural healing process. We are further heartened that significant resources can be protected at relatively low cost simply by carefully observing the ways natural forces operate. Patterning stabilization designs on naturally occurring phenomena increases the chances for successful protection of archeological deposits and resources while enhancing the natural environment.

Reference

Ehrenhard, John E, and Robert M. Thorne, 1991, "An Experiment in Archeological Site Stabilization: Cumberland Island National Seashore." *CRM*, 14:2, pp. 13-16.

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